

Middle Middle Miocene Structural Corsair Play

MM7 S1, #1671

Cibicides opima through *Bigenerina humblei*

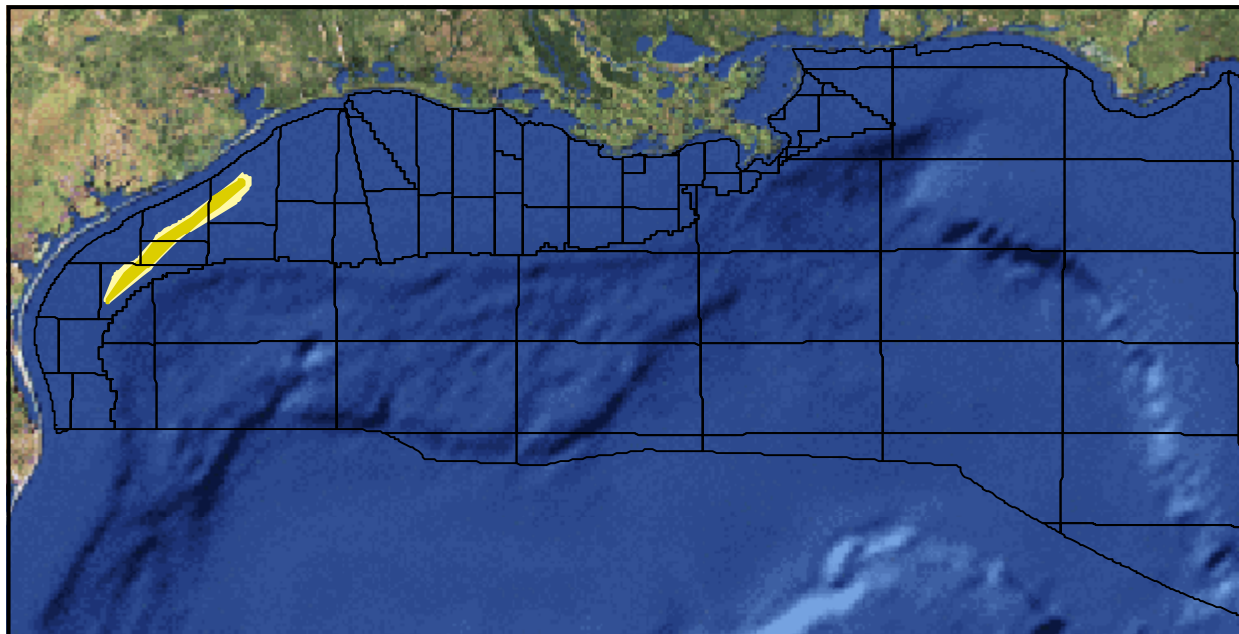


Figure 280. MM7 S1 map showing location of play. Play limit shown in light yellow; hydrocarbon limit shown in dark yellow.

Overview

The Middle Middle Miocene Structural Corsair Play (MM7 S1) contains reserves of 2,760.030 Bcfg and 9.114 MMbo (500.223 MMBOE) in 120 sands in 23 fields. The play extends in a narrow zone from the Mustang Island to Galveston Area ([Figure 280](#)).

Description

MM7 S1 is defined by (1) a gas-producing trend offshore Texas downthrown to the regional Corsair Fault System (Vogler and Robison, 1987), (2) significant expansion of the MM7 section across this fault system, and (3) the MM-5, MM-6, and MM-7 Chronozones, the tops of which are defined by the *Cibicides opima*, *Cristellaria* "I", and *Bigenerina humblei* biozones, respectively ([Figure 8](#)).

MM7 S1 extends in a narrow zone offshore Texas from the Mustang Island East Addition Area northeastward parallel to the Texas coastline to the central Galveston Area ([Figure 280](#)). This zone corresponds to a series of traps formed on the downthrown side of the regional Corsair Fault Sys-

tem, a major growth fault system that was active during the lower and middle Miocene. Hydrocarbons have been encountered throughout the play area.

The sediments of MM7 S1 show no lateral or basinward shift from those of the overlying Upper Middle Miocene Structural Corsair Play (MM9 S1) as both plays are controlled by the Corsair Fault System. MM7 S1 and MM9 S1 were deposited by the South Brazos Delta System (Morton et al, 1985) that prograded across the central Texas shelf and deposited large amounts of sediment onto the older Miocene slope. This sedimentary loading of the unstable shelf edge produced a prominent, highly listric normal fault that trapped a depositional complex of distal deltaic sediments in the down-thrown block (Rainwater, 1964; Meyerhoff, 1968; Morton et al., 1985, 1988).

The South Brazos Delta System became the dominant supplier of clastics to the Texas offshore during MM7 time as the North Padre Delta System, the major lower Miocene offshore Texas delta system, shifted much farther inland with the widespread lower middle Miocene (MM4), *Amphistegina*

B, flooding event (Morton et al, 1995). The South Brazos Delta was a large system occupying what had previously been an interdeltaic embayment (Morton et al., 1985).

MM7 S1 represents the oldest depositional sequence included in the two Corsair Plays, the youngest being MM9 S1. Both plays are very similar in geographical extent and structural control along the Corsair Fault System. However, MM7 S1 shows the greatest expansion of section along the fault system and contains 20 times the amount of reserves as MM9 S1.

Play Limits

MM7 S1 is bounded updip by the regional extent of the Corsair Fault System along which the MM7 section is greatly expanded. To the northeast, southwest, and downdip, MM7 S1 is limited by the relatively thin, unexpanded sediments of the Middle Middle Miocene Progradational (MM7 P1) and Middle Middle Miocene Fan 1 (MM7 F1) Plays that show no structural control by the Corsair Fault System.

Depositional Style

The Corsair Fault is only one of a series of growth fault systems that formed from the late Oligocene to late Miocene offshore Texas, but it is the most significant and well known because of the numerous hydrocarbon accumulations associated with it. Two structural styles are identifiable along the Corsair Fault System: (1) in the Galveston Area, the main Corsair Fault has broken into a series of secondary relief or en echelon faults with traps formed on their upthrown sides and (2) in the Mustang Island and Brazos Areas, large rollover anticlinal structures broken by antithetic faults have formed on the downthrown side of the main Corsair Fault. Though the Corsair Fault is classified as a primary salt-withdrawal fault system with detachments into salt, its hanging walls overlie shale ridges (Bradshaw and Watkins, 1994). The Corsair Fault exhibits up to a tenfold expansion of the middle Miocene section, the largest expansion of any of the offshore Texas growth faults. The MM7 expanded section reaches over 11,000 ft in thickness along the fault, and is overpressured in the Mustang Island and Brazos Areas.

MM7 S1 sediments formed as the South Brazos Delta prograded across the central Texas shelf and onto the older MM4 upper slope. Loading of the

unstable shelf and slope areas by the rapid influx of aggradational and progradational sediments during lowstand periods accentuated the fault system's development. MM7 aggradational sediments include delta plain (e.g., distributary channel/levee complexes, crevasse splays, distributary mouth bars, bay fill, intertidal deposits, and beach/barrier island deposits) and shallow marine shelf (e.g., delta fringe sands). These sands typically exhibit a blocky log signature that may show an upward-fining character at the top. MM7 progradational sediments include marine shelf and upper slope deposits (e.g., channel/levee complexes and crevasse splays that typically exhibit a blocky to upward-fining log character and distributary mouth bars, shelf blanket deposits, and delta fringe sands that typically exhibit an upward-coarsening log signature). Retrogradational sands, associated with the *Cibicides opima*, *Cristellaria* "I," and *Bigenerina humblei* flooding events also occur and exhibit a backstepping, upward-fining log signature.

Structural Style

Growth fault anticlines dominate the MM7 S1 structural style. Less commonly, normal faults, anticlines, and deep salt diapirs with hydrocarbons trapped on diapir flanks or in sediments draped over diapir tops occur.

Quantitative Attributes

On the basis of reserves calculations, MM7 S1 contains 98% gas and 2% oil (condensate). The 120 sands in the play comprise 216 reservoirs, all of which are nonassociated gas. All reserves are proved and estimated to be 2,760.030 Bcfg and 9.114 MMbo (500.223 MMBOE) (Table 133). These reserves account for 18% of the reserves for the MM7 Chronozone.

Cumulative production from MM7 S1 totals 2,171.028 Bcfg and 6.439 MMbo (392.743 MMBOE) from 108 sands in all 23 fields in the play. This production accounts for 17% of the MM7 Chro-

	No. of Sands	Oil (MMbbl)	Gas (Bcf)	BOE (MMbbl)
Proved	120	9.114	2,760.030	500.223
Cum. production	108	6.439	2,171.028	392.743
Remaining proved	62	2.676	589.002	107.480
Unproved	0	0.000	0.000	0.000

Table 133. MM7 S1 reserves and cumulative production.

nozone's total production. Remaining proved reserves in the play are 589.002 Bcfg and 2.676 MMbo (107.480 MMBOE) in 62 sands in 13 fields.

Table 134 summarizes that water depths of the fields in MM7 S1 range from 82-305 ft, and play interval discovery depths vary from 5,692-17,563 ft, subsea. Additionally, porosity and water saturation range from 15-33% and 16-53%, respectively.

120 Sands	Min	Mean	Max
Water depth (ft)	82	166	305
Subsea depth (ft)	5,692	10,055	17,563
Reservoirs per sand	1	2	7
Porosity	15%	24%	33%
Water saturation	16%	33%	53%

Table 134. MM7 S1 sand attributes. Values are volume-weighted averages of individual reservoir attributes.

Exploration History

MM7 S1 has a 30-year history of discoveries (Figure 281). The first sands in the play were discovered in 1969 in the Brazos A76 and Brazos 541 Fields. The maximum number of sands discovered in any year occurred in 1980 with 18 sands in four fields. However, the maximum yearly reserves of 623.656 Bcfg (112.504 MMBOE) were added in 1977 with the discovery of 8 sands in three fields. Discoveries peaked from 1975 through 1985 when over 70% of the play's reserves were added.

The largest sand in the play was discovered in 1977 in the Brazos A133 Field and contains an estimated 490.000 Bcfg (87.792 MMBOE)

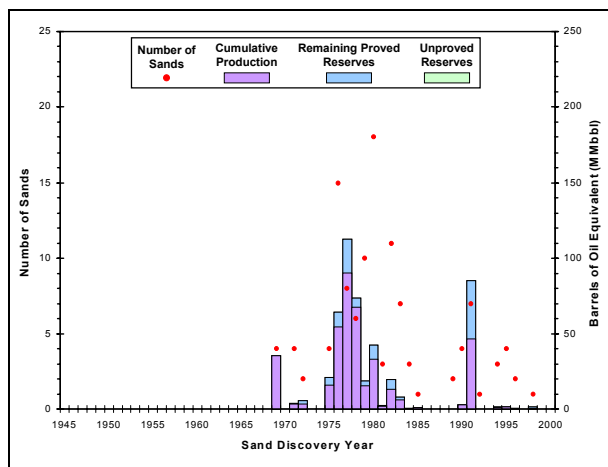


Figure 281. MM7 S1 exploration history graph showing reserves and number of sands discovered by year.

(Figure 282). Two other sands containing more than 50 MMBOE have been discovered in the play as well. The mean sand size for the play is 23.000 Bcfg (4.169 MMBOE). Seven sands, with estimated total reserves of 18.416 Bcfg (3.363 MMBOE), have been discovered since the first Atlas database cut-off of January 1, 1995.

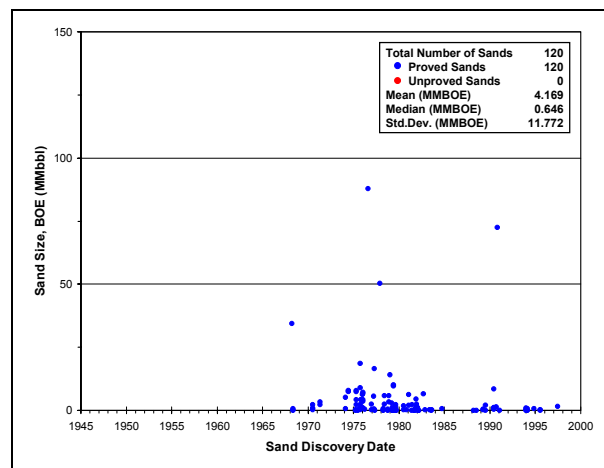


Figure 282. MM7 S1 sand discovery graph showing the size of sands discovered by year.

Production History

MM7 S1 has a 27-year history of production (Figure 283). Production began in 1972, and rose fairly steadily until peaking in 1986. Since then, oil (condensate) production has declined by almost half, while gas production has declined by one-third.

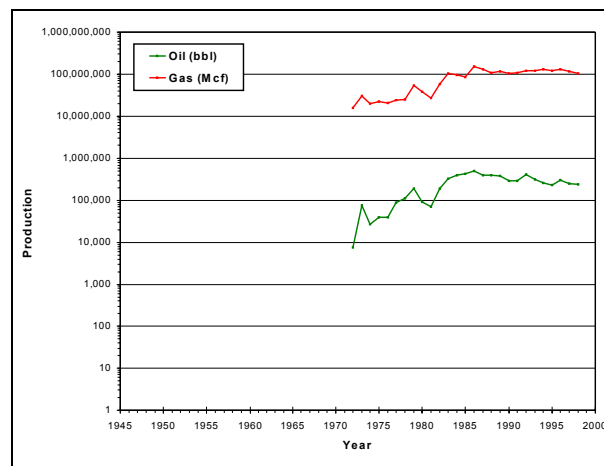


Figure 283. MM7 S1 production graph showing oil and gas production by year.